

K2 Observations of Solar-Like Planet-Hosting Stars in Field 1

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Characterizing planet-hosting stars to get as accurately as possible their masses, radii, and ages is essential to infer the properties of their exoplanets. Planetary mass and radius are only measured relative to the host star, while the age of the star is the best proxy for the age of its planets. Asteroseismology is the best tool to provide accurate stellar masses, radii and ages. The original *Kepler* mission was indeed based on this complementarity. **K2 offers a unique opportunity to characterize by asteroseismology planet-hosting stars outside the original *Kepler* field.** These seismic observations will be essential for future exoplanet missions like CHEOPS that will not do asteroseismology, and that will have some key targets in K2 fields. **K2 is also the tool of choice for exoplanet studies.** K2 observations of transiting planets (1 in Field 1) will allow accurate measurements of their radii that, combined with the mass, will put tight constraints on their internal composition.

We identified in K2 Field 1 five solar-like planet-hosting stars that should, according to our SNR computations for 80-day K2 observations, yield detection of oscillations. Given the ~ 5 min pulsation periods expected, **short-cadence observations** are needed:

- **WASP-85** (EPIC201862715, $K_p=10.25$): G8 star, with a transiting hot Jupiter planet: $1.0 M_{\text{Jup}}$, $1.2 R_{\text{Jup}}$ (both planet mass and radius have to be confirmed), $P_{\text{orb}}=2.66$ d. Short-period transiting planet, so an excellent target both for asteroseismology and exoplanet studies.
- **HD99492** (EPIC201661854, $K_p=7.2$): K2 star, with a $0.11 M_{\text{Jup}}$ planet on a $P_{\text{orb}}=17.0$ d orbital period. No transits discovered so far.
- **HD102195** (EPIC201650346, $K_p=8.5$): K0 star, with a Saturn-like planet ($0.45 M_{\text{Jup}}$) in a short-period orbit ($P_{\text{orb}}=4.11$ d). No transits discovered so far.
- **HD100777** (EPIC201172543, $K_p=8.4$): K0 star, with a Jupiter-like planet: $1.16 \pm 0.03 M_{\text{Jup}}$ on a large orbit: $P_{\text{orb}}=383.7 \pm 1.2$ d. No transits discovered so far.
- **HD99109** (EPIC201361857, $K_p=8.8$): K0 star, with a $0.50 M_{\text{Jup}}$ planet in a large orbit ($P_{\text{orb}}=439$ d). No transits discovered so far.

All these stars are late-type G or early-type K dwarfs. K2 observations will therefore be a good opportunity to characterize the amplitudes of the oscillations in this kind of dwarfs.

Finally, we also identified one planet-host red giant star. It is interesting for asteroseismology and for characterizing the nature of the companion. Given the oscillation periods expected, only **long-cadence observations** are needed:

- **HD102329** (EPIC201690230, 176.694354, 3.474294, $K_p=7.7$): K red giant star harboring a massive planet of $5.9 \pm 0.3 M_{\text{Jup}}$ in a 778 d orbital period. No transits discovered.